Improvements to the fast parameterization of atmospheric transmittances in RRTMG

Boyan Gu[a,*], Ping Yang[a], Jiachen Ding[a], and Eli J. Mlawer[b]

[a]*Department of Atmospheric Sciences, Texas A&M University, College Station, TX 77843, USA*
[b]*Atmospheric and Environmental Research (AER), Lexington, MA 02421, USA*

[*]*Presenting author (lmegby1@tamu.edu)*

RRTMG (the Rapid Radiative Transfer Model for GCM Applications) is one widely used broad-band radiative transfer model, which currently utilizes the correlated-k distribution (CKD) approach to calculate fluxes and cooling rates. However, the accuracy and speed of CKD may not be sufficient for current climate models. In this study, we develop the transmittance equations with linearly parameterized optical depths determined from a least squares regression to improve accuracy and efficiency for atmospheric absorption simulations. We compare fluxes and cooling rates calculated by the new and original RRTMG with rigorous LBLRTM (Line-By-Line Radiative Transfer Model) calculations. In total, 6 US standard atmospheric profiles and 42 atmospheric profiles from Atmospheric and Environmental Research (AER) are used to evaluate the performance of the new RRTMG against LBLRTM simulations from wavenumber 0 to 3250 cm^{-1}.

References

[1] L. L. Strow, S. E. Hannon, S. De Souza-Machado, *et al*., 2003: An overview of the AIRS radiative transfer model. *IEEE Trans. Geosci. Remote Sens.* **41**, 303–313.

[2] H. Zhang, T. Nakajima, G. Shi, *et al*., 2003: An optimal approach to overlapping bands with correlated k distribution method and its application to radiative calculations. *J. Geophys. Res.* **108**, 4641–4653.

Preferred mode of presentation: Poster